

# Laufer Distinguished Lectures 2018



## James E. Ferrell

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LAUFER CENTER  
FOR PHYSICAL AND QUANTITATIVE BIOLOGY

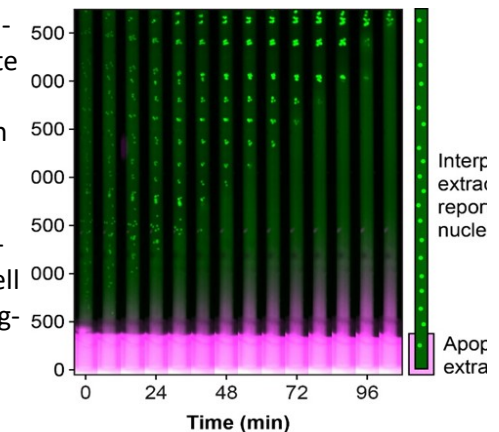


Mon April 23, 2:30 \*

### *Trigger waves in cell signaling*

Untethered cytosolic proteins can move 10  $\mu\text{m}$  or so in a few seconds by simple random walk diffusion. In a typical eukaryotic cell (with a radius of  $\sim 10 \mu\text{m}$ ), this is fast enough to allow a cell to respond in a spatially coordinated fashion to many stimuli. Over larger distance scales, regulators are often spread via flow. For example, hormones like insulin and epinephrine make their way around the body via the circulatory system on a time scale of a minute or so, whereas random walk diffusion would take about 500 years. An alternative to flow for long-range biological communication is the trigger wave. Action potentials are trigger waves; so are calcium waves in neurons and fertilized eggs; and so are cAMP waves in aggregating slime molds.

Here we will show that mitosis spreads through *Xenopus* egg cytoplasm via a trigger wave of Cdk1 activation, and apoptosis spreads via a trigger wave of caspase activation. These findings explain how a large cell like a frog egg ( $\sim 1.2 \text{ mm}$  diameter) and function in a spatially coordinated fashion, and they show that trigger waves are a recurring theme in cell signaling.



Tues April 24, 1:00 \*

### *How I became a systems biologist*

Laufer Center lecture hall 101 (Apr 23 & 24)

Hosts: Ken Dill & Gabor Balazsi

\* Reception honoring Dr. Ferrell follows Mon's lecture and refreshments served after Tues's lecture, in Laufer Hub 110



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